

**The University of Montana-Missoula:
A Campus with an Ecosystem**

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Abstract

In the span of a century since its founding, the University of Montana in Missoula has extended its educational, research and community footprint from its campus door step at the base of Sentinel Mountain to the entire 18-million-acre Crown of the Continent ecosystem that extends northward into Canada. This US–Canada transboundary ecosystem is defined by Glacier and Waterton Lakes National Parks, the world’s first international peace park, and the Bob Marshall Wilderness, one of the first designated wilderness areas. In reframing its place within this ecosystem, the University of Montana has become a landscape conservation champion and an enduring institutional steward of the region’s natural resources in the face of climate change. By example, the University of Montana is demonstrating that higher education has a keystone role in landscape conservation as the identity of the university is forever linked to its surrounding environs.

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The University of Montana-Missoula: A Campus with an Ecosystem

Introduction

During the Age of Discovery, it took nearly a month to cross the Atlantic Ocean. The New World was viewed as wilderness by the waves of early European explorers and colonizers who made the voyage with their slaves in tow. Of course, the indigenous population had a rather different perspective on history as their cultures were firmly rooted in these same landscapes. For many today, it is hard to imagine that in 1636, when Harvard College was established by the Colony of Massachusetts, the combined European and Negro population of all American Colonies was pushing above 5,000 toward 10,000 individuals. By 1701 when Yale College was established, the colonial population had swelled to over a quarter million. When 1776 arrived, the new United States had a combined white and black population of over 2 million people. The results of the latest 2010 US population census recorded roughly 310 million Americans. The population growth of the US mirrors the changing landscapes surrounding college campuses and the landscapes they once defined. While many college campuses may have urban identities today, that was not always the case when many of these institutions were founded.

It can be argued that the American college campus has always been defined by place. There are two elements of place—the “Where”—where colleges are geographically located (within their landscapes) and the “How”—how colleges campuses were designed to fit within those landscapes. College campus design has a long history of being embedded in place from Thomas Jefferson’s design of the University of Virginia in Charlottesville to the legacy of campus designs by the Olmsted family dynasty across the entire continent. Landscape and campus are two essential elements that have helped shape the character and culture of the majority of American colleges and universities. It has also been a two way street of developmental enterprise as many college towns and university locales have been transformed socially and economically by the enduring institutional aspect of higher education.

In this chapter, we discuss the efforts of the University of Montana, a public university established in 1893, to extend its ideal of campus from the halls of learning on its campus to the landscape that defines the region and ultimately the identity of the school. Once known as a “Campus with a Mountain”, the University of Montana is working toward the notion of a “Campus with an Ecosystem”—the Crown of the Continent Ecosystem. In the span of a century, the University of Montana has extended its notion of place as a global institution rooted within one of the most spectacular landscapes in North America. The University of Montana stands as example to other colleges and universities that want to “catalyze landscape conservation” (figure 1).

Figure 1. Crown of the Continent Ecosystem



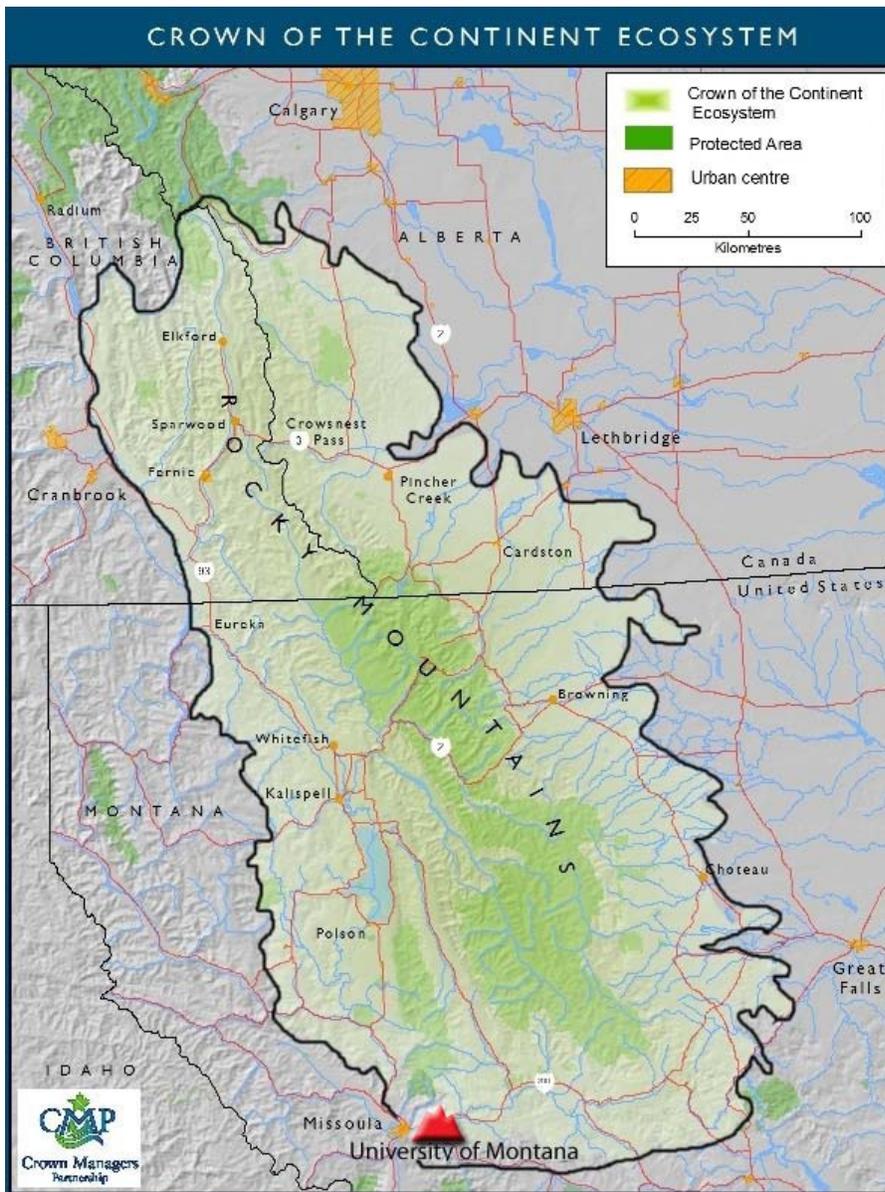
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The Ecosystem: Culture, Community, and Conservation

“Far away in Montana, hidden from view by clustering mountain peaks, lies an unmapped northwestern corner—the Crown of the Continent”
 —George Bird Grinnell, 1901

The University of Montana’s main Missoula campus lies at the southern entrance of the Rattlesnake Wilderness that extends north to the Crown of the Continent Ecosystem and the vast extent of wildlands of the Yellowstone to Yukon bioregion into Canada (figure 2). The 18-million-acre Crown of the Continent landscape, often referred to as the “Crown”, is a rare and special place, an ecological crossroads where plant and animal communities from the moist Pacific Northwest, wind-swept eastern prairies, arid southern Rockies, and cool boreal forests mingle. This spine of glacier-carved mountains is also the headwaters for three North American continental river basins, which flow to the Pacific Ocean, the Gulf of Mexico, and Hudson Bay. No other landscape within the contiguous United States retains its full complement of native habitat and native predators—wolves, grizzly and black bears, cougar, coyote, fox, wolverine, bobcat, and lynx—as well as large populations of moose, elk, bighorn sheep, pronghorn, mountain goat and deer. Only small populations of bison remain confined within a few special bison management areas.

Figure 2. Crown Managers Partnership



The Crown is also a place where nations and cultures meet. Across this vast landscape, indigenous cultures have thrived for centuries. At the core of the region are Waterton Lakes National Park in Canada and Glacier National Park in the US. In the late 1890s, noted natural historian, George Bird Grinnell, and others lobbied the US Congress to establish Glacier National Park. Grinnell referred to the region as the “Crown of the Continent.” and the name has remained since. An inseparable unit, both national parks were designated by the U.S. Congress and Canadian Parliament in 1932 as the world’s first international peace park. Years later, the United Nations Education, Scientific, and Cultural Organization (UNESCO) gave Biosphere Reserve status to Glacier National Park in 1976 and to Waterton Lakes in 1979. Both parks were named a World Heritage Site in 1995, acknowledging the area’s rich ecological and cultural values. Together these parks cover about 1.3 million acres or 13 percent of all lands in the Crown.

In Montana, the Bob Marshall Wilderness expanded the Crown's inventory of protected lands under the Wilderness Act of 1964. The Scapegoat and Great Bear wildernesses were joined to "the Bob" in 1972 and 1978 respectively. With the Mission Mountains Wilderness and the Rattlesnake Wilderness, these state-side wildernesses encompass about 1.6 million acres. Today, a remarkable 83 percent of land within the 10 million-acre Crown region is managed in the public trust.

More than 21 federal, Tribal, First Nations, state, and provincial agencies strive to cooperatively manage the Crown's wildlands, wildlife, timber, minerals, oil and gas, and other resources. Increasingly, the region's rural communities are diversifying, blending amenity and knowledge-based economies with agriculture, logging, and energy development. All of this makes the Crown a rare and special place, a vibrant home for people held here by a quality of life not found outside the region. It is a magical landscape worthy of long-term public-private stewardship for present and future generations.

Humans have wandered through the Crown of the Continent since the last great ice sheets retreated about 11,500 years ago. Those who preceded the Blackfeet, Kainaiwa, Ktunaxa, Salish, and Kootenai peoples were among the first to hunt, fish, and gather food here, making their homes on the plains, in the forests, and along the rivers. Clovis-era spear points and arrowheads, along with other evidence, show that the first people explored the Crown more than 10,000 years ago. This diverse, spectacular landscape was sacred to native peoples, and remains so today, as First Nations continue to rely on "the Backbone of the World" for its wildlife, plants, rivers and lakes, and spirit (Bates, 2010).

These first inhabitants interacted with the landscape in many ways - using fire to replenish grasslands, funneling bison over cliffs (buffalo jumps) as a process of hunting, wearing trails and roads into the earth, and establishing camps and villages in favorable sites. By the early 1800s, when the first white explorers and trappers arrived, much of the Crown region was already settled, with tribal territories, hunting grounds, and travel routes well established.

Today, the Crown of the Continent is considered one of the poster landscapes exhibiting the impacts of climate change. The visible retreat of the region's glaciers bears witness to a changing climate. By 2030, climatologists and glaciologists predict that most or all of the 25 glaciers remaining in Glacier National Park will disappear (Hall and Fagre, 2003). As a result, the Crown's diminishing cryosphere will transform from a more permanent feature to a seasonal and less climate-tempering presence. The loss of glaciers represents the most obvious impact on the landscape. Other changes will manifest themselves in more subtle ways, and will play out in no fewer than 21 watersheds shared by the United States and Canada.

The Crown of the Continent is well positioned to serve as a laboratory for observing and predicting climate change impacts. The region encompasses the intersection of four major climate zones and a broad array of microclimates. This unique topography presents a distinct opportunity for researchers in the Crown to play a leading role in global efforts to investigate climate change impacts across a range of climate types and at differing elevations. Significant efforts to understand these dynamics are already underway.

The natural boundaries of the Crown of the Continent provide a useful delineation for thinking about river basins, wildlife habitat, and cultural influences. This geographical region, however, is more challenging when considering economic forces currently at work and how they will influence the region in the future. Historically, much of the region's economic growth depended on the Crown's abundant natural resources. Communities formed around timber mills, rich farmland, mineral resources, and recreational destinations. Faced with the growing influence of global market forces, some of these commodities lost their competitive advantage, and the engines of economic development shifted and diversified.

Today, the region's economic opportunities relate largely to tourism, energy development, and a growing professional services sector. Importantly, nonlabor sources such as investments, pensions, and public benefits now account for approximately 40 percent of personal income in the counties on the U.S. side of the Crown of the Continent. These and other trends have diversified the Crown's economy and demanded a more educated and skilled workforce. In response, local businesses have linked with Tribal and two-year colleges to shape curricula and programs, helping both retrain workers and prepare the region's next generation to be competitive in tomorrow's economy.

Over the past several decades, growing communities and shifting land uses have reshaped the ring of human development that surrounds the protected areas at the Crown's core. Three notable trends are currently playing out: (1) larger towns and cities have grown considerably in population over the past 30 years and are projected to experience continued growth; (2) smaller towns and more rural locations have seen little population growth and in many instances have declined in population over the past 30 years; and (3) an increasing number of land use efforts seek to accommodate concentrated growth in and around populations centers while preserving important environmental, natural resource, aesthetic, and agricultural values.

Much of the new development sprawled into surrounding farmland and the woods close to the borders of protected public lands. This growth was fueled in part by new technology that allowed people to conduct business in more remote locations, and by a booming market in second homes. For example, Montana's Flathead County, which supports the largest economic center and greatest number of residents in the Crown, grew from 59,218 residents in 1990 to 89,624 in 2009, a 51 percent increase in two decades. The same is true north of the border. Calgary, the closest major city to the Crown, grew by 90.1 percent from 1980 to 2009; nearby Lethbridge grew by 55 percent over the same period (Bates, 2010).

The Ecology of Governance

“The challenge in... collaboration is that each participant has only a limited amount of attention to devote to the collaboration.”

—Michael Neilsen, *Reinventing Discovery*

In response to this mix of complicated issues, individuals and organizations throughout the Crown are rising to the occasion and creating new forms of democratic practice. In a formal sense, the Crown of the Continent includes two countries, two provinces, and one state, with

more than 20 government agencies exercising some type of authority and management of the landscape. While each of these expert-driven institutions play an important role in managing natural resources, most of the issues facing the Crown present themselves at a spatial scale that crosses jurisdictional and cultural boundaries. While the formal legal and institutional boundaries delineate ownership and management authority, they also act as dividers between disparate cultures, attitudes, goals, and values. Such divisions stymie efforts to address shared challenges in an effective manner.

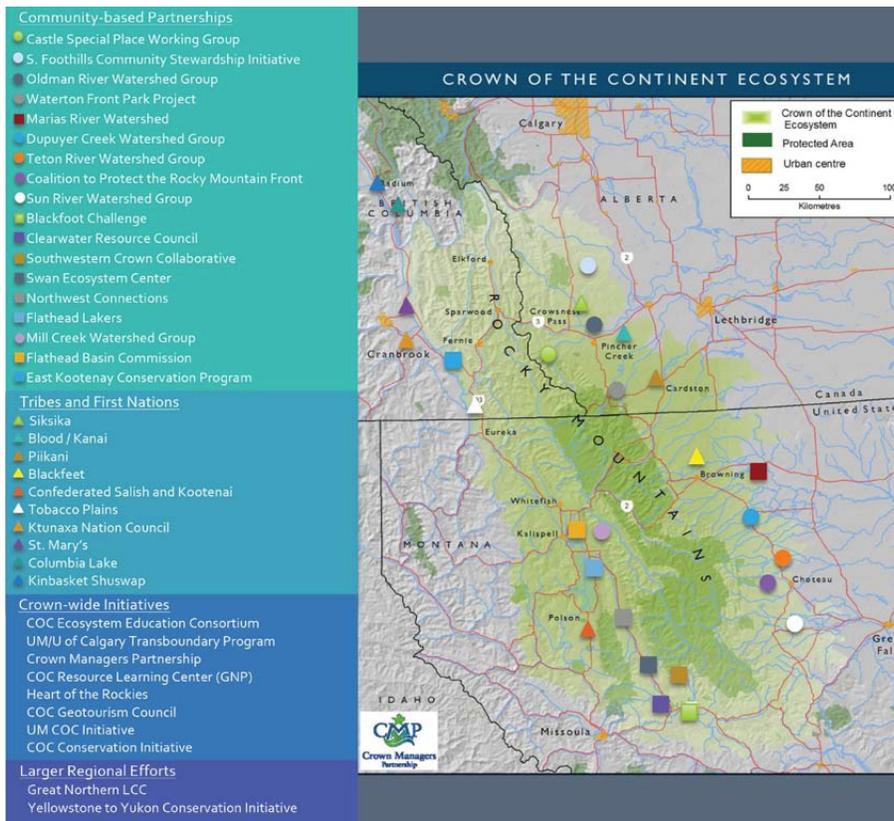
People who care about the Crown and its future are increasingly looking to bridge these jurisdictional and cultural barriers to address the challenges they collectively face at the spatial scale at which they are occurring. What is occurring, in fact, is a nested system of political arrangements where people with vision, passion, and capacity are creating new opportunities to define issues, frame options, and take action. This nested system is akin, at least in part, to Ostrom's "polycentric systems of governance" (Ostrom 2009). Starting at the smallest geographic scale, there are at least 20 community-based partnerships in the Crown, most of them initiated and convened by citizens (see map below). These community-based partnerships create the basic building blocks within the emerging nested system of governance.

Yet with all the vibrancy that comes from these civic and governmental groups, few are actually interconnected to address the problems presented by large scale threats to the region such as climate change, habitat fragmentation, water management and invasive species. It is only recently that many of these local land-based and watershed initiatives have come to grips with the enormity and complexity of many of these threats. Once recognizing the scale of impacts, these groups are challenged by the costs related to cooperation at larger scales and the diversity of values among stakeholders as they reach further afield. In this mix, universities embody the array of values and interests reflected in these large scale landscape efforts and can provide the connective tissue and independent facilitation that bring stakeholders together.

The enduring institutional presence of universities evident on figure 3, below, can also facilitate long term community engagement in landscapes that require long term solution strategies.

This "ecology of governance", an interconnected web of individuals and organizational actors, in the Crown illustrates the larger trend in natural resource policy—citizens and nongovernmental organizations or associations are increasingly taking the lead to convene, coordinate, and implement actions to foster conservation and stewardship. This trend not only suggests a shift from an expert driven model of politics to more democratic approaches, but also raises some important questions about "governance" and the role of citizens, professionals, and communities in governance—where governance is more than government. It is much more inclusive, engaging both formal and informal actors and institutions. How this proposition develops for large scale, mixed ownership landscapes is of course an open question.

Figure 3. Community-based partnerships in the Crown of the Continent.



From a political perspective, this trend in natural resource policy creates a healthy tension between bottomup and topdown approaches to governance. In a recent book entitled *Planning with Complexity*, Judith Innes and David Booher (2010) suggest that this tension can be explained—at least in part—by the difference between “instrumental rationality” and “collaborative rationality”. Instrumental rationalists tend to approach natural resource and environmental issues as largely technical problems that can be effectively solved by sound science and the separation of politics from decision making (i.e., the expert-driven model of politics).

By contrast, collaborative rationality sees the world as inherently uncertain and assumes that all decisions are necessarily contingent. From this perspective, planning and policy are not about finding the best solution (indeed, it is unlikely there is one best solution), but rather discovering many better ways of proceeding than following the status quo. Collaborative rational political processes are about engaging with diverse members of a community—including citizens, associations, and experts—to jointly learn and work out how to generate improvements in the face of conflict, changing conditions, and conflicting sources of information. Such processes—as illustrated by the ecology of governance in the Crown of the Continent—are not only about finding new ways to move forward, but also about helping communities adapt and be resilient in the face of new challenges. One ongoing challenge for experts and institutional actors is to realign their expectations and practices in a way that is more conducive to the practices of collaborative rationality.

Universities are also challenged by this duality of reasoning. As a matter of course, universities are not predisposed to support collaborative rationality especially within the realm of natural resources applied management and policy for a number of reasons. First, natural resource policy problems, with few exceptions, require interdisciplinary responses. However, the policy-relevant disciplines are organized (and separated) by departments and dominated by specialized silos that make collaborative research exceedingly difficult. The resulting scholarship typically fails to provide adequate diagnoses or prescriptions for problems as they exist in the world. Second, one primary audience for many academics is other academics, not policymakers or citizens. Success for them is defined as a positive response to one’s intellectual agenda, rather than worldly problem solving. Their goals often are to generate ideas that further understanding of problems and that develop new knowledge, rather than pursuing practical problem solving. Good results and successes are measured by gains in knowledge and understanding and use of their ideas by others pursuing related scientific and policy inquiry.

Given the differing motive of academics, government officials, and citizens, citizens and officials often have limited confidence in the role and relevance of universities in helping to solve natural resource and environmental problems. The “ivory tower” syndrome is a well-worn cliché among people outside academia. Moreover, elected and appointed officials tend to be preoccupied with politics over policy. Partisanship and the effort to get reelected take precedence over the need to solve on-the-ground problems. These impulses suggest that the reaction of citizens and officials to a refined (more civic) mission of universities will be slow and halting. For all these reasons, universities are often ill equipped to assist citizens and officials solve natural resource and environmental problems. To overcome these impediments, if universities are to contribute substantially in this societal arena, they will need to hire leadership and devise institutional mechanisms that reward and support student and faculty participation in policy and management problem solving.

The table below (figure 4) summarizes the different attributes of the stereotypic academic and policy communities, and suggests the need to build one or more two-way bridges to cross the divide.

Figure 4. A Tale of Two Cultures, adapted from the work of Peter Szanton.

| ATTRIBUTE | ACADEMIC COMMUNITY | POLICY COMMUNITY |
|------------------------------|------------------------------------------------------------------------------|---------------------------------------------------------------------------|
| Objective | Respect of academic peers | Approval of voters |
| Time horizons | Long | Short |
| Focus | Internal logic of problem | External logic of setting |
| Mode of thought | Inductive, generic | Deductive, particular |
| Mode of work | Solo | Collaborative |
| Most valued outcome | Original insight | Effective solution |
| Mode of expression | Abstruse, qualified | Simple, absolute |
| Preferred form of conclusion | Multiple possibilities; Depends on objectives Uncertainties emphasized | One “best solution/” objectives unspecified uncertainties submerged |
| Concern for feasibility | Small | Great |
| Stability of interest | Low | High |

Acknowledging this dichotomy of cultures, the University of Montana has taken steps to serve as the institutional (and political) bridge between these two worlds.

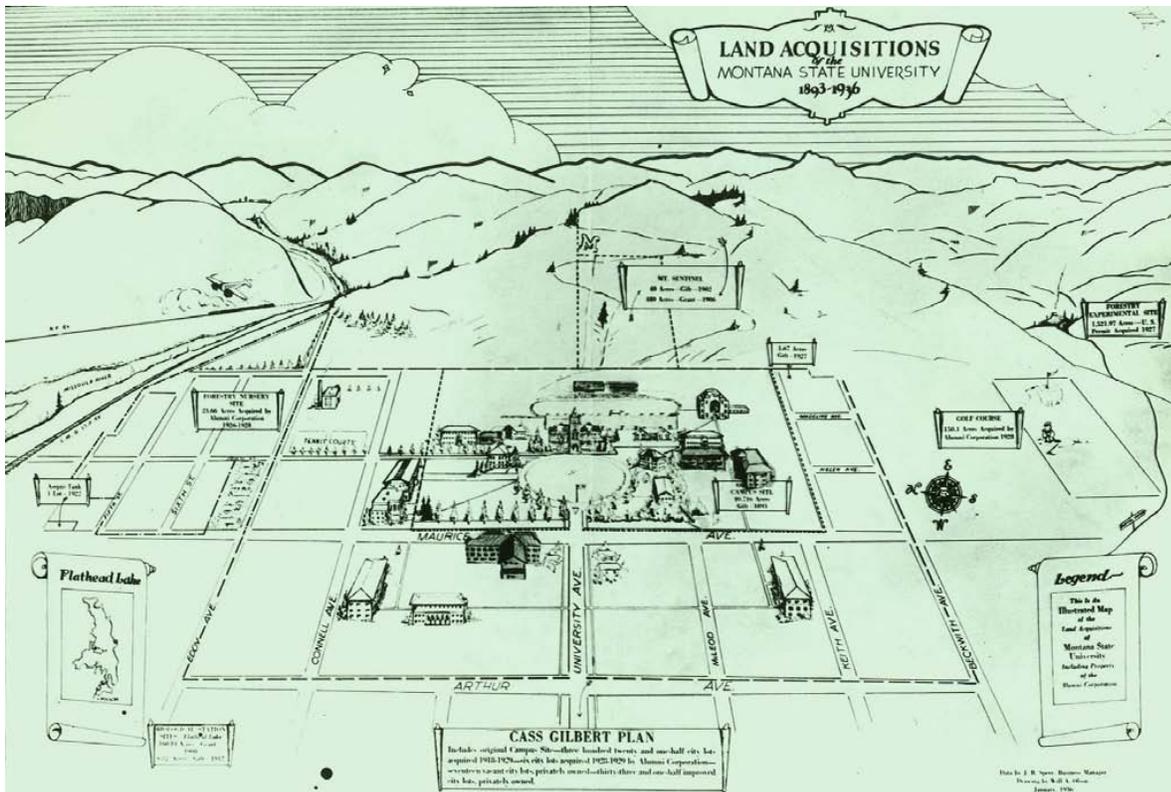
The University of Montana: Historical Context

“We now have a campus with a mountain.”

—Univ. Montana President Oscar Craig 1986

When the University of Montana was established by the Montana State Legislature in 1893, four years after statehood, the population of Missoula was approaching 4000 people. The University was given land adjacent to Sentinel Mountain just south of the town. The university was then referred to as the “Campus with a Mountain” (UM Annual Report 1896) (figure 5). By 1889, the University of Montana had expanded its reach and established a solid research and educational presence in the nearby Crown of the Continent with the founding of its Flathead Lake Biological Station by Professor Morton J. Elrod. Along with his fellow contemporary Grinnell, Elrod advocated for the creation of Glacier National Park and became the park’s first naturalist. Today, the Flathead Lake Biological Station is one of the world’s premier freshwater research centers and in its wake, the University of Montana has over 40 faculty in at least five colleges now actively engaged in all aspects of the Crown. From Native American Studies to Geosciences, the Crown is inextricably linked to the University’s educational, research and public service mission.

Figure 5. Map of University of Montana, 1896.



In 1999, the University of Montana and the University of Calgary established a joint Transboundary (US–Canada) Policy, Planning, and Management Initiative to advance conservation across the entire Crown of the Continent. This initiative created one of the first university-level, landscape-based transboundary research and educational collaboratives in the world. More specifically, the effort served to link the University of Montana’s Environmental Studies Program within the College of Arts and Sciences with the University of Calgary’s Faculty of Environmental Design. The opportunities provided to students and faculty have been profound as they have been able to engage broader governmental, tribal, industry, and NGO communities in various applied solution-oriented processes. As a result, the Universities of Montana and Calgary established a more coordinated framework for US and Canadian collaboration in landscape conservation and management in the Crown.

The Rise of the Roundtable of the Crown of the Continent

Building from this experience, the University of Montana further enhanced its formal involvement in the conservation of the region. Former University President George Dennison, established a University of Montana’s Crown of the Continent Initiative in 2007, which seeks to deepen the University’s links to the region through outreach, extension and synthesis publications. Particularly the public oriented publications and the educational offerings of the Initiative have enhanced the presence and image of the University in engagement in the Crown. About the same time the Initiative was launched, the Center for Natural Resources and Environmental Policy at the University of Montana, at the behest of the Crown Managers Partnership, a government interagency collaborative, launched the Roundtable of the Crown of the Continent to connect all the constituencies, jurisdictions and interests that support a broad conservation perspective in the ecosystem. The Roundtable represents a substantial investment of university financial and human resources in shaping the collective conservation agenda in the region. In partnership with the Lincoln Institute of Land Policy, the University of Montana seeks to create an example of ecosystem level innovation through strategic higher education participation.

The Roundtable is an ongoing forum to bring together people who care about this special place. It is based on the observation that the future of the region is being shaped by over 100 government agencies, non-government organizations, and community-based partnerships. Through workshops, forums, policy dialogues, and conferences, the Roundtable (1) embraces the 18 million acre region; (2) includes all perspectives and communities; (3) focuses on connecting people, facilitating communication, and catalyzing action; (4) supplements other activities; and (5) promotes sustainable communities and landscapes. The Roundtable has intentionally embraced three pillars of societal values in the landscape—Community/Sustainable Economic Development, Culture, and Conservation.

The Roundtable is not any particular group of people, a government commission, or a new organization. By contrast, it provides the connective tissue across the diverse individuals, groups, and communities that work and play in this remarkable region. The working assumption of this process is that **people are connected to the landscape but not connected to each other**. By connecting them, the Roundtable can enhance conservation and sustainable natural resources

management including economic development across the entire ecosystem. The University of Montana is serving as the independent broker and the facilitator of this process that connects a large landscape agenda with large-scale human engagement.

The University of Montana is not the only higher educational actor in the Crown. There are almost a dozen universities, tribal colleges, community colleges on both sides of the US and Canada border with links to this region (see attached list). There are additional university interests from around the globe. As part of connecting people, the Roundtable is also working to create a network of colleges and universities within the ecosystem. The Roundtable seeks to mobilize and engage this broader community of faculty and students to participate in both regional and sub-regional initiatives in supporting the culture, community, and conservation values of the region. The University of Montana via the Roundtable is providing leadership to connect its fellow colleges and universities in marshaling a response equal to the threats to the region.

Other Significant University of Montana Perspectives

In addition to the Crown specific activities of the University, two of its academic units heavily involved in the Crown have developed strong integrative (non-silo) and practical approaches for much of their work. These activities contrast sharply with the stereotypic perspective of universities outlined previously. Both the College of Forestry and Conservation and the Environmental Studies Program (College of Arts and Sciences) have multiple disciplines represented among their faculty members and they both engage in instruction and research that transcends disciplinary boundaries and focuses on practical problem solving in both the policy and management arenas. The perspectives of these academic units about their roles in areas such as the Crown provides a pool of faculty members and students ideally suited to work with officials and citizens of the Crown.

In addition, the University of Montana, as the host of the Rocky Mountain Cooperative Ecosystem Studies Unit (RM-CESU), a federal university partnership that transcends the international boundary of the Crown by including the University of Calgary among its 12 university and multiple US federal agency partners, has a pivotal role in engaging in practical research, technical assistance, and educational projects with federal land managers. A significant number of projects sponsored through the RM-CESU have been conducted within the Crown and have brought university faculty members and students into direct contact with land and natural resource managers to help solve management problems or to analyze policy issues for decision making. This also is significantly counter to the stereotypic depiction of the academic world.

The Need for Large Scale Landscape Response

With visible climate change impacts looming over the region and drawing on the resources of the University's Crown activities and capabilities, the Roundtable is becoming a vehicle for multi-stakeholder and multi-sectoral engagement for scaling up adaptation response to climate change. To date, climate adaptation has proved easier to define than to implement, especially with regard

to large landscapes and associated communities. The uncertainty factor in terms of precise climate impacts and ecological responses has stymied many intervention efforts. The risk of unintended consequences or even concern for making a bad situation worse has too often paralyzed implementation action. One of the more vexing challenges to climate adaptation is the issue of spatial scale.

Figure 6. Grinnell Glacier Repeat Photo, 1940. Unknown Photographer, 2006 USGS. Courtesy of USGS.



While it is true that climate impacts will have variable local manifestations, ecological processes such as hydrology, fire, migration, phenology, and species invasiveness operate at the large landscape level. Thus, the scale of adaptation action must be commensurate with the scale of the threat (figure 6). This observation suggests that adaptive management should be implemented at multiple spatial scales through a process of network governance that recognizes socioeconomic and political realities. Fortunately, the Crown is home to an array of collaborative initiatives already identifying and implementing climate adaptation strategies, and formulating efforts that can be enhanced and leveraged through more carefully coordinated partnerships.

The Crown of the Continent ecosystem has all the human and natural resource elements to prototype largescale adaptive management and network governance. The opportunity to connect the region's capacity to sustain communities and landscapes across all jurisdictions, across all communities, and across all sovereign borders is at hand. All the necessary ingredients are available to support implementation of a climate adaptation management system for large landscape conservation in the Crown.

The University of Montana is the higher educational anchor in the Crown of the Continent landscape. This ecosystem faces immense challenges and the University is not shirking the problems laid at its doorstep. The land and the University are intertwined. The University of Montana is a "Campus with an Ecosystem."

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